

## **Proposed Research to Validate the Preliminary Flow Number Criteria for Intersections**

The previous section of this proposal provided a rational approach for generating preliminary flow number criteria for intersections. As the traffic speed decreases, the rutting resistance as measured by the flow number must increase to provide pavements with approximately equal rutting performance. Depending on the average vehicle speed through an intersection, the flow number for intersections mixtures should be 4 to 10 times that required for mixtures subjected to an average traffic speed of 64.4 km/h (40 mi/h). To select a reasonable flow number speed adjustment factor for intersections, flow numbers for mixtures with documented good and poor rutting performance at intersections will be measured and compared to the preliminary flow number criteria developed for 64.4 km/h (40 mi/h). Details of the proposed research are presented below.

### **Task 1. Identify Intersection Mixtures**

Task 1 consists of identifying mixtures having good and poor rutting performance at intersections. For this task, the research team must rely on the expertise of the Technical Oversight Committee to identify the mixtures that will be tested in Task 2. Based on the available budget, a total of 10 mixtures can be tested and analyzed. One half of the mixtures should be mixtures exhibiting good rutting performance at intersections and one half should be mixtures exhibiting poor rutting performance at intersections. In selecting the mixtures the performance should be based on pavements that are structurally adequate and do not exhibit signs of fatigue cracking. For each of the mixtures selected, the Technical Oversight Committee should provide the following to the research team:

1. A copy of the approved WisDOT mixture design,
2. Approximate location of the intersection(s) where the mixture was used,
3. Contact for the mix producer for obtaining aggregate samples,
4. Contact for the binder supplier for obtaining binder samples.

### **Task 2. Obtain Representative Materials and Perform Flow Number Tests**

In Task 2, the research team will contact the producers and binder suppliers identified in Task 1 and arrange for samples of materials to be sent to Advanced Asphalt Technologies, LLC's

laboratory in Sterling, VA. The laboratory testing will require approximately 100 lb of mix. To address possible gradation differences between the material sampled and the approved WisDOT mixture design, approximately twice the required materials will be requested. It is assumed that the producers and binder suppliers will be willing to collect the samples using containers and shipping materials provided by the research team. Shipping of the materials to Advanced Asphalt Technologies, LLC will be paid by the research team.

### **Task 3. Perform Flow Number Tests**

In this task, specimens will be prepared and flow number tests will be performed on each of the 10 mixtures selected in Task 1. The specimens will be prepared in accordance with AASHTO PP 60, *Proposed Standard Practice for Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor*, and flow number testing will be performed in accordance with: AASHTO TP 71, *Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) Using the Simple Performance Test System*. Three replicate specimens of each mixture will be prepared and tested. Tests will be conducted using the NCHRP Project 9-33 testing conditions:

- 50 % reliability pavement temperature for the project location
- Air void content of  $7.0 \pm 0.5$  percent
- 600 kPa deviatoric stress
- 0 kPa confining stress

### **Task 4. Analyze Flow Number Data**

The flow number data collected in Task 3 will be analyzed in Task 4. The principal analyses envisioned are:

1. Statistical comparison of the flow numbers for the mixtures identified as having good rutting performance at intersections compared to those having poor rutting performance. It is anticipated that the flow numbers for the mixtures identified as having good performance will be significantly higher.

2. Comparison of the flow numbers for the intersection mixtures with the preliminary flow number criteria developed for a traffic speed of 64.4 km/h (40 mi/h). It is anticipated that the flow numbers for the mixtures identified as having good rutting performance will be significantly higher than the preliminary criteria developed for a traffic speed of 64.4 km/h (40mi/h). How much higher will indicate the magnitude of the speed correction factor for the flow number that should be used for intersection mixtures.

### **Task 5. Reporting**

In Task 5, the report for WHRP Project 0092-09-01 will be expanded to include the additional work included in this proposal. Additionally, the tutorial will be expanded to include discussion of the flow number criteria for intersection mixtures.

### **Work Time Schedule**

Figure 1 present the proposed time schedule for this work. The time schedule was developed to complete the additional work within the original contract time period. It was assumed that approval for the additional work would occur in November, 2009, which is the 11<sup>th</sup> month of the project. Selection of the mixtures by the Technical Oversight Committee should be completed by the end March, 2010 so that research team can arrange shipment of the materials in April and May, 2010. Four months have been allocated for the laboratory testing and one month has been allocated for data analysis. The data analysis will be completed at approximately the same time as that for the original scope of work. The reporting will require one month and will coincide with the reporting for the original scope of work. Progress reporting, the draft and revised final reports, and the close out presentation will be modified to include this additional work. The schedule for these will remain as originally proposed.

Task/Activity	Contract Month																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Task 1: Identify Mixtures												X	X	X	X												
Task 2: Obtain Materials																X	X										
Task 3: Perform Flow Number Tests																	X	X	X	X							
Task 4: Data Analysis																					X						
Task 5: Reporting																						X	X				

**Figure 1. Schedule.**